

## INTRODUCTION TO TRANSPORTATION

*Introduction to Transportation* is an introductory course designed to help students become familiar with fundamental principles in modes of land, sea, air, and space transportation, including basic mechanical skills and processes involved in transportation of people, cargo and goods. Students will gain and apply knowledge and skills in the safe application, design, production, and assessment of products, services, and systems as it relates to the transportation industries. Content of this course includes the study of how transportation impacts individuals, society, and the environment. This course allows students to reinforce, apply, and transfer their academic knowledge and skills to a variety of interesting and relevant transportation related activities, problems, and settings.

- DOE Code: 4798
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: None
- Credits: 1 credit per semester, maximum of 2 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

### Application of Content

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences.

## Content Standards

### Domain – History of Transportation

**Core Standard 1** Students validate the historical, current, and future importance of transportation technology

#### Standards

- ITT-1.1 Identify and describe different modes of transportation
- ITT-1.2 Explore the history of transportation and technical progression
- ITT-1.3 Describe technology as it is applied in the context of transportation
- ITT-1.4 Identify and evaluate the impact of transportation on daily life
- ITT-1.5 Identify major events in the history of the United States that impacted transportation
- ITT-1.6 Investigate how historic events changed the course of technological advancement in different modes of transportation
- ITT-1.7 Describe the emerging technologies in the transportation industry and how transportation will evolve

### Domain – Transportation Technology

**Core Standard 2** Students analyze technical components in a transportation system that must be considered when designing and using any form of transportation.

#### Standards

- ITT-2.1 Examine basic vehicle structural and suspension principles as they relate to performance in different modes of transportation
- ITT-2.2 Examine how a vehicle is controlled and guided in each of the modes of transportation

- ITT-2.3 Identify support systems that are necessary for transportation systems to effectively work
- ITT-2.4 Explain the interaction and operation of different internal components in various land, air, and sea vehicles
- ITT-2.5 Explore how interrelated systems make the vehicle move through their different environments

**Core Standard 3** Students evaluate basic operations and physical principles used in all forms of land, air, space, and water transportation.

**Standards**

- ITT-3.1 Examine Basic Engine Operations of all modes of transportation
- ITT-3.2 Differentiate between Basic Engine Classifications
- ITT-3.3 Identify different types of power used to propel a vehicular system
- ITT-3.4 Examine Basic Principles of Electricity
- ITT-3.5 Explain the transfer of power from the source to actual movement
- ITT-3.6 Interpret scientific principles in the design of vehicles for each mode of transportation

**Domain – Transportation Design**

**Core Standard 4** Students choose appropriate technical, design and engineering processes used to create different modes of transportation.

**Standards**

- ITT-4.1 Identify appropriate materials used in designing transportation systems
- ITT-4.2 Describe the engineering involved in designing the parts of a transportation system
- ITT-4.3 Identify the use of standardized parts in the transportation systems
- ITT-4.4 Use different measurement methods using a variety of tools
- ITT-4.5 Examine how automotive systems help minimize emissions, control engine temperature, and keep occupants safe
- ITT-4.6 Compare how mechanical, fluid, and alternative systems work as related to systems in a transportation vehicle
- ITT-4.7 Identify and apply math and science principles as related to the appropriate transportation system
- ITT-4.8 Examine safety features of a vehicular system

**Domain – Career Exploration**

**Core Standard 5** Students integrate skills and behaviors required for self-sufficiency and management of their personal and professional lives.

**Standards**

- ITT-5.1 Evaluate employment and career pathway opportunities related to established career interest(s) in the field of transportation
- ITT-5.2 Evaluate resources that keep workers current in the career field
- ITT-5.3 Describe the emerging transportation-related jobs and industry needs
- ITT-5.4 Demonstrate skills and attitudes needed for lifelong learning

**Domain – Working Safe**

**Core Standard 6** Students design workplace procedures based on established regulations to promote a safe working environment.

### **Standards**

- ITT-6.1 Demonstrate appropriate tool safety and shop operations that are common across all the Transportation careers
- ITT-6.2 Identify state and national safety regulations for working in a transportation facility
- ITT-6.3 Identify the function and application of tools, equipment, and technologies used in transportation systems
- ITT-6.4 Practice the proper storage of tools
- ITT-6.5 Practice appropriate shop/lab upkeep and maintenance duties
- ITT-6.6 Practice safety procedures for handling and disposal of hazardous materials
- ITT-6.7 Practice safety procedures in cases of emergency
- ITT-6.8 Choose the appropriate tools to use on particulars systems

### **Domain – Transportation and Society**

**Core Standard 7** Students analyze the effects transportation has on our world to determine what is most efficient and effective vehicles for moving people and goods.

### **Standards**

- ITT-7.1 Examine the possible ways that natural resources could be used to conserve fuel and energy use in various vehicles
- ITT-7.2 Analyze the effects transportation has on the environment by both vehicular and support views
- ITT-7.3 Differentiate alternate fuel options for all modes of transportation
- ITT-7.4 Identify and describe how mass transportation affects society and the environment
- ITT-7.5 Appraise the effect of the built support systems for transportation on the environment

### **Domain – The Science of Transportation**

**Core Standard 8** Students integrate science and math concepts used in vehicles in different modes of transportation to understand the relationships of technology development.

### **Standards**

- ITT-8.1 Identify and describe Newton's laws of motion as they pertain to each mode of transportation
- ITT-8.2 Apply and adapt the basic principles and forces of flight
- ITT-8.3 Apply and adapt Archimedes' principle as it pertains to water transportation
- ITT-8.4 Apply and adapt the propulsion as it relates to movement of a vehicle
- ITT-8.5 Investigate how aerodynamics affects the vehicles in each modes of transportation
- ITT-8.6 Explain Bernoulli's principle in transportation modes
- ITT-8.7 Identify and describe energy conversion within each transportation system
- ITT-8.8 Distinguish the different mathematical principles involved in a transportation system such as mass, volume, horsepower, center of gravity, work and power

## **Process Standards**

### **Common Core Literacy Standards for Technical Subjects**

#### **Reading Standards for Literacy in Technical Subjects 9-10**

The standards below begin at grade 9 and define what students should understand and be able to

do by the end of grade 10. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

### **Key Ideas and Details**

- 9-10.RT.1 Cite specific textual evidence to support analysis of technical texts, attending to the precise details of explanations or descriptions.
- 9-10.RT.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- 9-10.RT.3 Follow precisely a complex multistep procedure when performing technical tasks, attending to special cases or exceptions defined in the text.

### **Craft and Structure**

- 9-10.RT.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific context relevant to *grades 9-10 texts and topics*.
- 9-10.RT.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
- 9-10.RT.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

### **Integration of Knowledge and Idea**

- 9-10.RT.7 Translate technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- 9-10.RT.8 Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a technical problem.
- 9-10.RT.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

### **Range of Reading and Level of Text Complexity**

- 9-10.RT.10 By the end of grade 10, read and comprehend technical texts in the grades 9-10 text complexity band independently and proficiently

### **Writing Standards for Literacy in Technical Subjects 9-10**

The standards below begin at grade 9 and define what students should understand and be able to do by the end of grade 10. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations – the former providing broad standards, the latter providing additional specificity.

### **Text Types and Purposes**

- 9-10.WT.1 Write arguments focused on *discipline-specific content*.
- 9-10.WT.2 Write informative/explanatory texts, including technical processes.
- 9-10.WT.3 Students will not write narratives in technical subjects. *Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In technical, students must be able to write precise*

*enough descriptions of the step-by-step procedures they use in their technical work that others can replicate them and (possibly) reach the same results.*

#### **Production and Distribution of Writing**

- 9-10.WT.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- 9-10.WT.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- 9-10.WT.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

#### **Research to Build and Present Knowledge**

- 9-10.WT.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- 9-10.WT.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation
- 9-10.WT.9 Draw evidence from informational texts to support analysis, reflection, and research.

#### **Range of Writing**

- 9-10.WT.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

#### **Career and Technical Student Organizations**

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in a Career and Technical Student Organization, such as SkillsUSA.